# ATTACHMENT NO. 6



## HACCP PLAN

NRGE LTD, MOORESFORT, LATTIN CO TIPPERARY

TIPPERARY MILLING CO LTD

HACCP for an AD facility

1. **Daily Checks**
- Check all lids and covers are sound and closed after daily feed completed
- Check that all areas are clean after feeding
- Check visually that all gauges and automatic controls are working
- Check visually and audibly that digester mixing is working correctly
- Check that digester temperature is correct
- Check the pasteurisation recording system
- That daily log book is filled
- That gates are closed after visiting the site

2. **Weekly Checks**
- That pipes, pumps, valves and tanks are sound
- That reception area drains are clear
- There is no sign of vermin, if there is take remedial action
- That level monitors are working correctly
- That fences and gates are in good order

3. **Areas classified as Dirty**
- Reception areas during reception of wastes and until washed and clear of debris after delivery
- Dirty clothes store
- Storage tanks for untreated waste
- Site dirty water collection tank and dedicated pump
- All equipment used pre-pasteurisation
- Pasteurisers before pasteurisation process is completed



4. **Areas classified as clean**
- All areas and equipment not classified as dirty, in particular
- Pasteurisers after pasteurisation is complete and all equipment post pasteurisation
- Long term digested liquid storage tank and pump and pipework to the long term store
- Fibre shed
- Control area

5. **Managing risk of cross-contamination between clean and dirty areas**
- Operatives will wear designated dirty clothing when receiving deliveries of non farm material, operating and maintaining dirty equipment or otherwise working in dirty areas or with dirty equipment
- Operatives when dressed in dirty clothes will not travel into clean areas
- All vehicles that pass into dirty areas will have their wheels washed before leaving that area
- All delivery vehicles will unload over an area designated as dirty and have any debris from the delivery washed off before leaving the dirty area
- Any splashes created during delivery, feeding or maintenance will be washed down immediately after operations are completed
- During maintenance and servicing of dirty equipment care will be taken to ensure that any waste material contained in them is cleaned out into other dirty areas.

- All dirty areas drain into the dirty water collection tank. The contents of this tank are transferred by dedicated pump and pipes into the feeding system for the digester and pasteuriser system
- The pasteuriser will not be emptied unless it has achieved the correct time and temperature parameters

**6. Deliveries of waste material**

All reception areas have concrete surfaces and drain into the collection tank.
Care will be taken to ensure that

- all personnel that will oversee the delivery dress in clothing (boots, gloves and boiler suit) that are dedicated to such purpose
- the collection tank is empty before delivery commences
- a delivery vehicle parks in such a way that the unloading point is over the concrete reception area.
- all hoses are sound and connected and positioned correctly
- there is sufficient space in the reception/storage tanks to receive the material
- that vehicles are free of debris after delivery is complete
- that any spillage is cleaned immediately after delivery, by shovel either directly into the reception pit, and by washing down
- wash footwear and gloves, if contaminated, on reception areas
- pump empty the collection tank into reception pit after delivery and washing down
- all lids on tanks are closed
- remove dedicated clothing and place in store or take overalls for washing if necessary



**7. Records**

- All waste from non farm sources will only be taken for treatment if it has a delivery docket, that states the date, the quantity and type of waste and provides the name and address of source of the material and the transport company, and is signed by an authorised person from each.
- A waste reception certificate is raised for all deliveries of non farm waste. This certificate states the date received, the type and quantity of waste and from whom it was produced. The reception cert is signed by an authorised person from the AD facility.
- *A feedstock log book will be kept which will record*

a) All deliveries of farm waste to the facility including the date, the type and volume of material, and who delivered it to the facility
b) Volumes of non-farm waste received by the facility
c) Daily feed volumes
d) Amount pasteurised each day
e) Volumes of fibre removed from site, and on what date, by whom and to where
f) Amounts of liquid fertiliser removed from site, by whom, on what date and to where
g) Details of any analysis of material that is undertaken or provided
h) Details of any materials (time, quantity, type, how and to where) other than the processed products that have to be removed from the site

- *A process log book will be kept which will record*

a) that all procedures during reception of waste and feeding the digester are maintained

b) that daily and weekly checks have been carried out
c) process observations
d) changes in method of process management
e) any remedial action that was taken at any time
f) details of when, where and type of vermin if found and the remedial action taken

**8. Vermin control policy**

No waste will be left in any location where vermin can access.
Any spillages that occur will be cleaned immediately
Visual checks will be carried out weekly to see if there are any rats on the site, if any sign is apparent then poison or other methods to remove them will be undertaken.

**9. Ensuring particle size and pasteurisation has been achieved**

Is technology dependant and therefore the HACCP will vary from site to site

**10. Contingency plans for digestion process difficulties or failure**

*Chemical contamination* (eg high level of bleach) of the feedstock can cause process problems. Waste will only be taken from regular and reputable suppliers, who have been made aware of the important issues regarding waste quality. However if a bad batch does get delivered without notice, the action to be followed will vary with each site.

- If the digester is given time to recover and the temperature is maintained generally the process will continue and soon return to normal performance.
- The contaminated waste can then either be returned to the supplier for them to deal with or possibly could be fed to the digester at a diminished rate.



*Foaming*

Foaming of digesting material can occur if:

- Too much fat/vegetable oil is fed
- The feed diet is changed rapidly
- The digester pH drops too low (which can occur if the digester is fed too much of a material that breaks down easily)
- Mixing fails
- Digester temperature falls

Foaming is generally controllable by increasing the mixing and ensuring that a temperature of around 40C is maintained in the mesophyllic process, and postponing feeding the digester till foaming diminishes.
If foaming cannot be controlled by the above measures, the material will expand, so there must be a safety system, which allows the foam to escape as a digester is a closed vessel. If the pasteurisation process is pre-digestion this is not an issue as far as the ABP regulations are concerned. If pasteurisation is post digestion then the foam must be contained and returned to the digester or pasteuriser as soon as possible.

*Process failure*

It is most unlikely that there will ever be a complete process failure if the feedstock contains a larger proportion of farm waste than off farm waste. This is because the bacteria in the process occur naturally and a wide variety of bacteria families are present in animal manures. Therefore generally if the digester continues to be fed slowly with the farm waste it will recover in time.

*Loss of performance in process*
This would result in a decrease of gas production from the digesters. Therefore there must be an alternative source of heat for the pasteurisation process other than that created by using the biogas

**11. Security of the AD facility site**
The site will be suitably fenced.

*Animal intruders*
In the unlikely event of any animal breaking into the facility area, there would be no risk of harm to the animal as there is no place they could have access to the waste and all tanks and roofs are constructed to withstand the weights and pressures that could be exerted by an animal, and all surface areas would be clean.

*Human intruders*
It is always possible, regardless of what measures one takes, that human intruders may access the facility. Therefore the best method of managing this risk is to keep all surfaces clean of waste material, so that walking over the site should not create a problem.



**12. Areas of potential risk and how this risk will be managed (not already mentioned above)**
*a) Damage to the tanks by vehicles*
There should be a wheel stop for vehicles backing up to an off-tipping tank
All vehicle movements at the facility will be supervised
*b) Burst pipes –*
visual checks and quantity monitoring
*c) Valves being opened at the wrong time*
Experienced operatives only will operate the facility and each operation will be double checked before commencement
*d) Valves being left open after use*
The operative will stay at the facility for at least 10 mins after completing the days operations and before carrying out the final check that all is in order.
*e) Tank over-filling*
The first fail safe is the level controls and indicators. The second fail safe is visual observance. The third failsafe is that any overflow from the tanks should drain into the collection tank.
*f) Biogas leaks*
Weekly checks of all pipework will be carried out. Biogas is a very smelly gas and is quite noticeable if escaping, so a smell of gas at the facility would alert one. The risk of explosion from any escaping biogas is very low, however the areas where there is a potential risk of a gas leak should be designed to always have good air movement
**Issues to be met in ABP regs**

- Siting and fencing to keep out animals
- Processing under cover
- Processing must preferably within 24hrs after delivery
- Storage must
- Pasturiser cannot be by-passed, should monitor time against temperature, recording devices to continuously record measurements, safety system to prevent insufficient heating
- Facilities for cleaning/dis-infecting vehicles and containers before leaving dirty area
- Have a own laboratory or use an external laboratory for checking hygienisation achieved
- Equipment must be maintained and where appropriate calibrated by an approved authority
- Processed material must be managed in a way to avoid cross contamination
- Pasteurisation requires max particle size of 12mm and temp of 70C for 60 minutes
- Plants processing only catering waste may use other parameters to be agreed

Record keeping

- Deliveries to and collections from the site
- Thermographs of the pasteurisation process
- preventative measures against vermin
- Cleaning procedures and inspection schedules and results
- Equipment maintenance and calibration
- Sampling proceedures, schedules and results
- Traceability system for all processed goods
- HACCP plan and report

# ATTACHMENT NO. 7



# PROCESS CONTROL SYSTEM

Mooresfort,

Lattin,

Co Tipperary,

**Tel 062 55385**
**Fax 062 55483**
E-mail NRGE@iol.ie

# SCADA Description

Project No.:
Made by: M Mc Eniry
Issued: 13th March 2008

# Contents

# 1 Description

This material describes the SCADA-structure of a biogas plant. The scope of supply and interfaces are described in the quotation. This material is not part of an offer and is not a description of the scope of supply, but it only information to support the plant description.

## 1.1 Installations

1.1.1.1 Instrumentation

Instrumentation is delivered according to the flow charts and this description.

Flow and energy meters are mounted with flow distances in accordance with the directions of the supplier.

All instruments, machinery, etc. located in gas classified areas are delivered with approval and are mounted in accordance with the valid rules for this.

Gas blowers are frequency controlled and delivered as gastight blowers.

Temperature transmitters are mounted in sleeves welded on the tubes in lengths corresponding to the insulation thickness.

Pressure transmitters (liquid systems) are mounted on pressure gauge pipes for pressure relief and constant liquid column.

Pressure gauges are glycerine filled (e.g. disc diameter 100 mm, 0-10 bar, ½" pipe thread). A shut-off valve is mounted in front of all pressure gauges.

Thermometers (disc diameter 100 mm, 0-120°C) are mounted with pockets.

All indicating instruments will be located in positions, which can easily be read from the floor.

All pressure switches and thermostats, etc., which are to be operated, are mounted in a height suitable for operation.



### 1.1.2 Electrical Switchboards and Installations

1.1.2.1 Panels

A main distribution switchboard with a field for power meter is installed. Switchboards and control panels for gas engine, boiler and auxiliary equipment are installed.
Panels for receiving station, heating modules and biogas part are installed.

The distribution panel is designed according to EN 60 439-1 and 439-3, while panels and switchboard for the machinery is designed according to EN 60 204-1.

Panels located in panel / control room are supplied in IP41, while panels for location in machinery plant are supplied in IP44.

The SCADA system is made with functions for automatic and manual operation of each motor starter.

PLC equipment is mounted in separate panel field and I/O' for instrumentation is connected in terminals.

Frequency converters are normally located outside the panels.

Standard components of Western European quality are used in the panel and for machinery components.

1.1.2.2 Electrical installations
Electrical installations are performed for the machinery plant.

All other installations such as internal supply cable and medium voltage cable between middle voltage switchboard plants are purchased/performed by the Client.

Electricity for machinery and buildings shall be installed in separate cable trays.

Cable trays are supplied in materials suitable for mounting in the specific environment.

All cables from cable trays to electronic components are located either in a pipe or a flexible cable. Alternatively, strips are used.

Cables in the terrain buried directly in the ground.



## 1.2 SCADA System

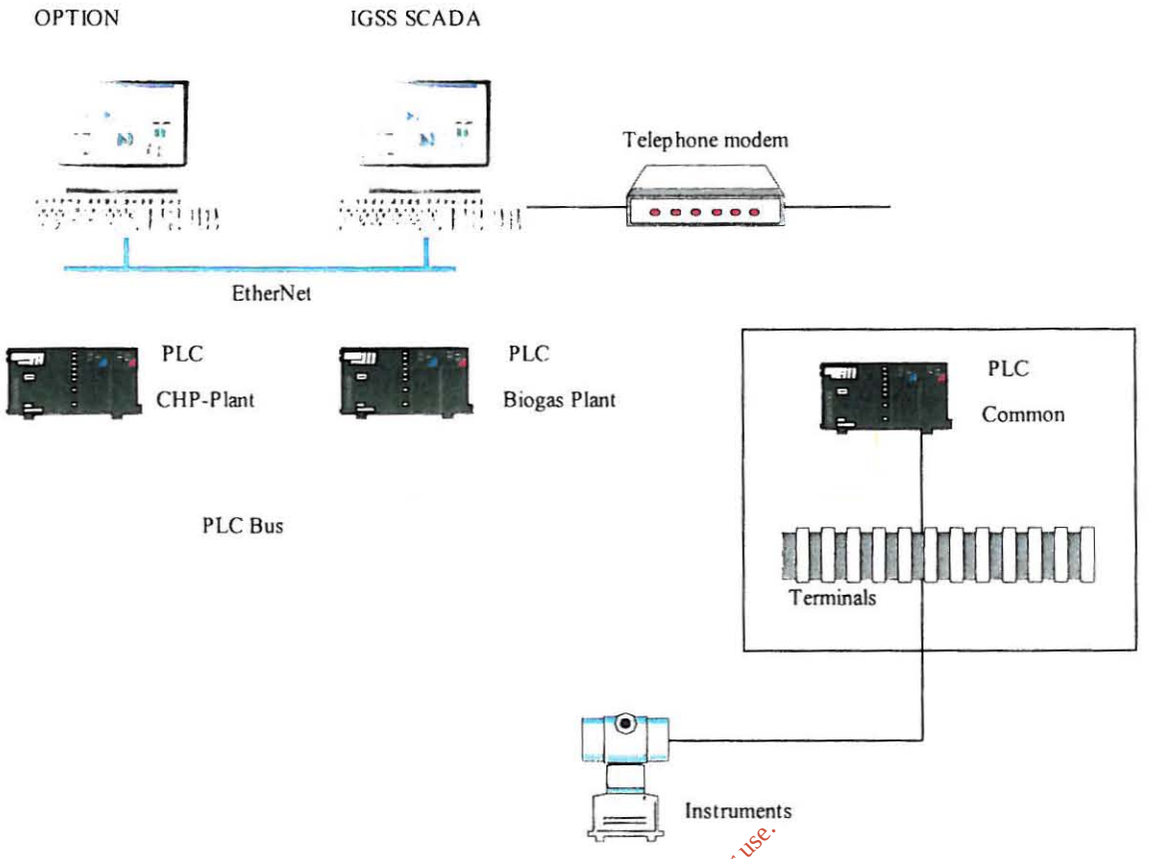
The SCADA system is based on the make IGSS from Seven Technologies A/S.

IGSS is running on a standard PC with Windows XP. IGSS is constantly developed and thus fulfil all requirements regarding openness in relation to data exchange with other PC based systems. The system is designed with one main station and one operator station in the control room. The software is installed on standard PC is according to present standard.

The quotation also includes a standard modular PLC system of make as Siemens S7-300 series. The PLC can be programmed in both off-line and on-line mode, and programming is performed through a program designed in accordance with approved IEC norm. It is possible to program the PLCs locally or through a modem.

As shown on the below diagram of the design of the SCADA system, a service modem is installed. This modem serves two purposes: Service and remote monitoring in connection with ordinary service, remote user instruction, updates, etc. and for remote plant operation by the operating crew on duty.

UPS is installed for supply of PLC and PC with a capacity of 10 minutes of battery operation. The figure below shows an example of the configuration for a biogas plant.






### 1.2.1 System Software

The operating system is Windows XP. IGSS software is supplied in a runtime version.

### 1.2.2 User Interface

The user interface is an industry standard user interface with symbols for valves, engines, instrumentation, etc. The system is designed with clear screen pictures which make it possible for the operating crew to get a quick overview of each part of the plant with regard to reading of dynamic values, functionality and operator possibilities. P&I diagrams are used as a starting points for the screen pictures for each section. The system is built up as a function hierarchic system.

The SCADA system is secured against unintentional changes of e.g. set points and against operating errors by means of personal passwords, which give access to defined user and operation levels.

The interface is designed in a logic way with icons and general menus in order to secure a constant overview of the present operation condition of the plant.

The system is designed as an object orientated system with TAG numbers. An object is e.g. a pump, a blower, a pump or a valve.

### 1.2.3 Curves

The system is designed with a number of fixed curves. However, it is very easy for the operator to set up individual curves with up to 5 analogue values at the time. The values can be selected from a

list or pointed out by means of the mouse on the screen. Zooming is easily made by means of the mouse directly on the curve picture.

### 1.2.4 Reporting

Reports and curves are made on the basis of a proposal, which is forwarded to the Client for approval. Reports can be printed both automatically and upon request.

### 1.2.5 Handling of Alarms

Alarms are presented on the screen and on the alarm printer. The system is designed with the necessary safety circuits hard-wired to the safety relays, in order to ensure that a stop of the plant due to disconnection of a safety component requires manual reset of the safety relay on the panel front. Alarms are registered on the system with time stamping for both on and off acknowledgement of alarms. The alarms can be divided into several levels.

### 1.2.6 Equipment for Main Station and Operator Station

The quotation includes two of the below PC's. The hardware is specified at the time of purchase as the development within PCs constantly moves performance in relation to price. Therefore, the specification below is intended as an indication only. One of the computers will be equipped with a modem to enable remove control by the personnel on duty.

| | |
|---|---|
| Hardware : | 2 GHz Intel Pentium 4 CPU, 512 MB RAM, 80 GB hard disc, CD-RW, 20" screen, key board and mouse, net card |
| Printer: | Inkjet printer |
| Software: | Windows XP |



### 1.2.7 IGSS Software

The SCADA software is Windows based and is a complete system for data acquisition, storage and calculation of derived values for data from the substations. The quotation is based on IGSS SCADA software from seven - Technologies for main station and operator stations. Xergi has installed IGSS SCADA software on energy plants since 1992 and thus holds extensive knowledge of this system.

The basis of the software is a reliable data acquisition, safe storage of data and functions relevant for handling of the connected sub-stations.

### 1.2.8 IGSS Introduction

IGSS is a SCADA system used for monitoring and controlling processes. IGSS is used within a wide range of areas including water supply, heat supply, food industry and railway security. More than 25,000 licenses have been sold since the system was first launched in 1984.

IGSS is a object orientated program. This gives a number of useful advantages for the system designer and the operator. The most important feature of the system is that a process component consisting of a number of I/O points is treated as an individual object in IGSS. This means that the system designer and operator has the same understanding of an object and that the characteristics of the object can be seen and adjusted from one dialogue box. Types and templates are other expressions used in IGSS. Templates are useful for the system designer in the way that he can define

one template tan the base as many objects with identical characteristics on this template as required.

### 1.2.9 Data Exchange

Openness is one of the cornerstones in the IGSS system. Therefore, IGSS supports many different standards, including DDE, ODBC, OPC, OLE Automation and ActiveX. This makes it possible to extend IGSS data with 3rd party programs. If a large configuration is to be made, it may be required to define the process components in an external data base and then import the data to IGSS.

### 1.2.10 Scaling

The possibility of scaling is a key function in IGSS. As the system is based on a genuine client/server architecture, it is easy to increase the number of operator stations or the number of objects in the configuration. If the company covers a large area, remote operator station can be connected by means of dial-up lines or directly on LAN.

When choosing IGSS it is necessary to acquire the number of objects and operator stations required at present. The number of objects and operator stations can be increased at any time if required.

### 1.2.11 Alarm Function

The system includes a conventional alarm list in which all alarms are presented with identification, etc. The alarm list icon is always visible and the alarm list can be called up from all screen pictures when activating the icon. Notification is given on all incoming alarms, no matter where the operator is working in the program; an alarm remains on the screen until they have been signed for. All alarms can be printed.



### 1.2.12 Login Safety System

The system is secured with a login procedure controlling rights for operation in the system by means of login name and password.

# 2 Layout of pictures

In the following you se different pictures from a typical Biogas Plant.

## 2.1 Overall View

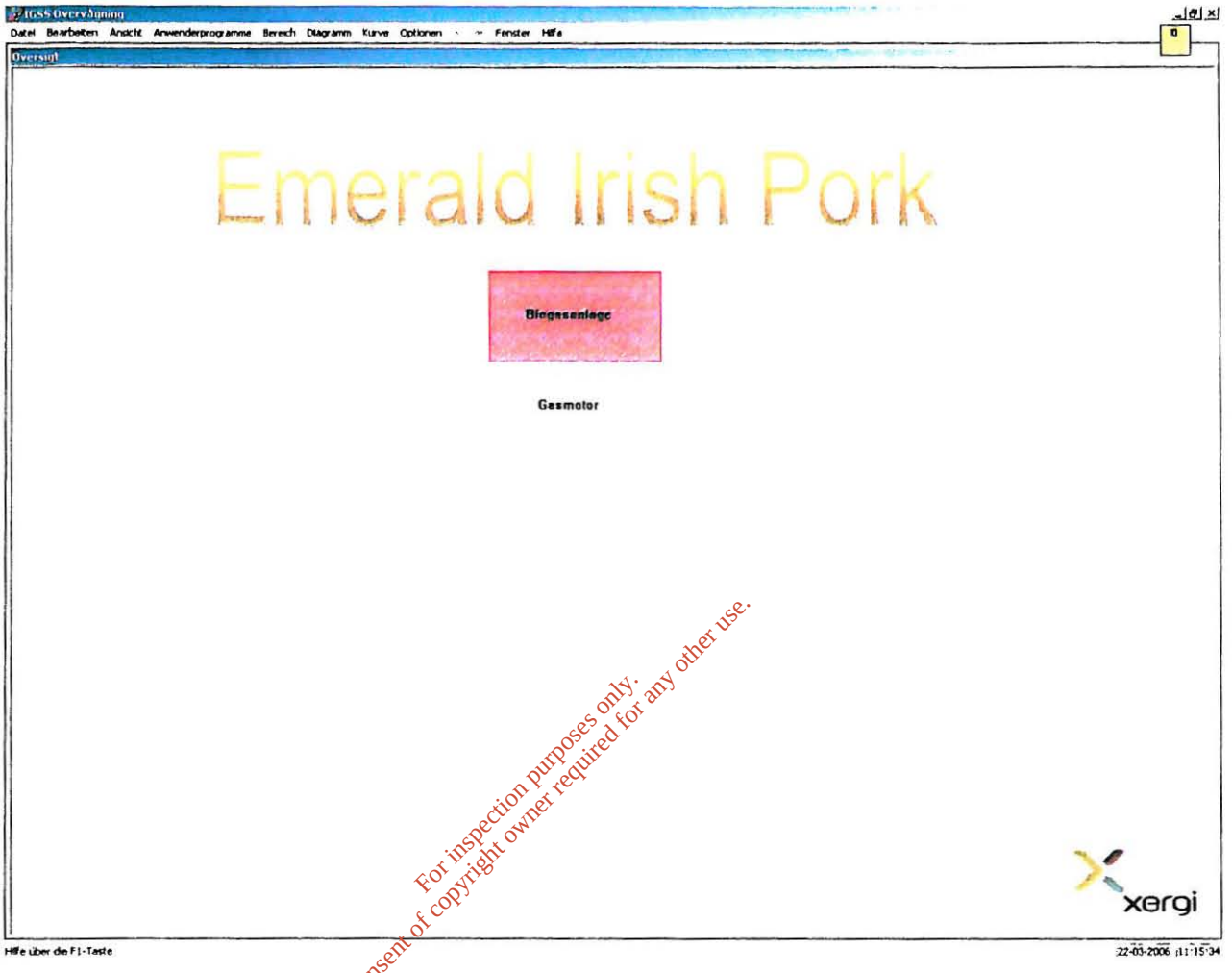





Figure 1 Overall View

## 2.2 Biogas Plant

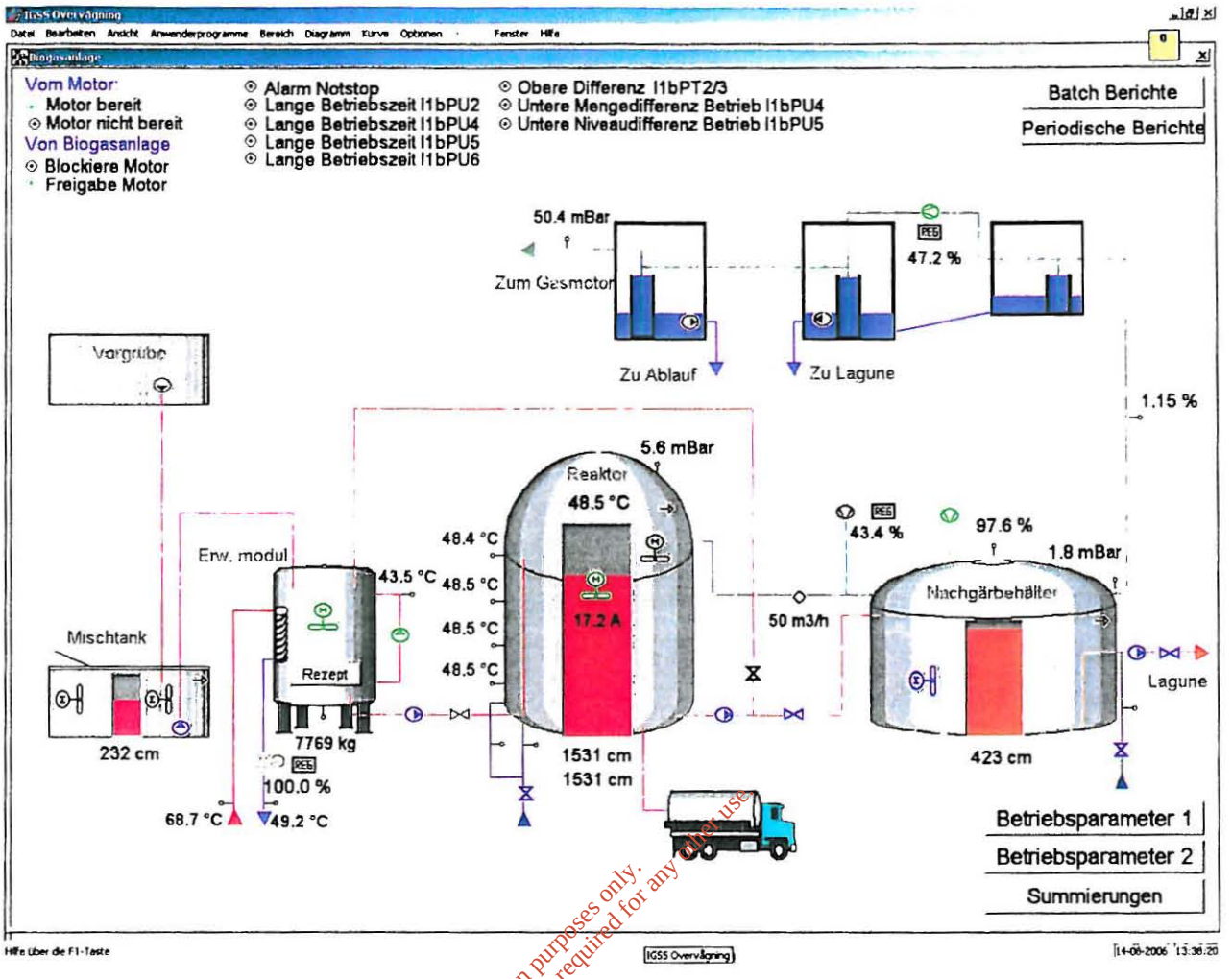
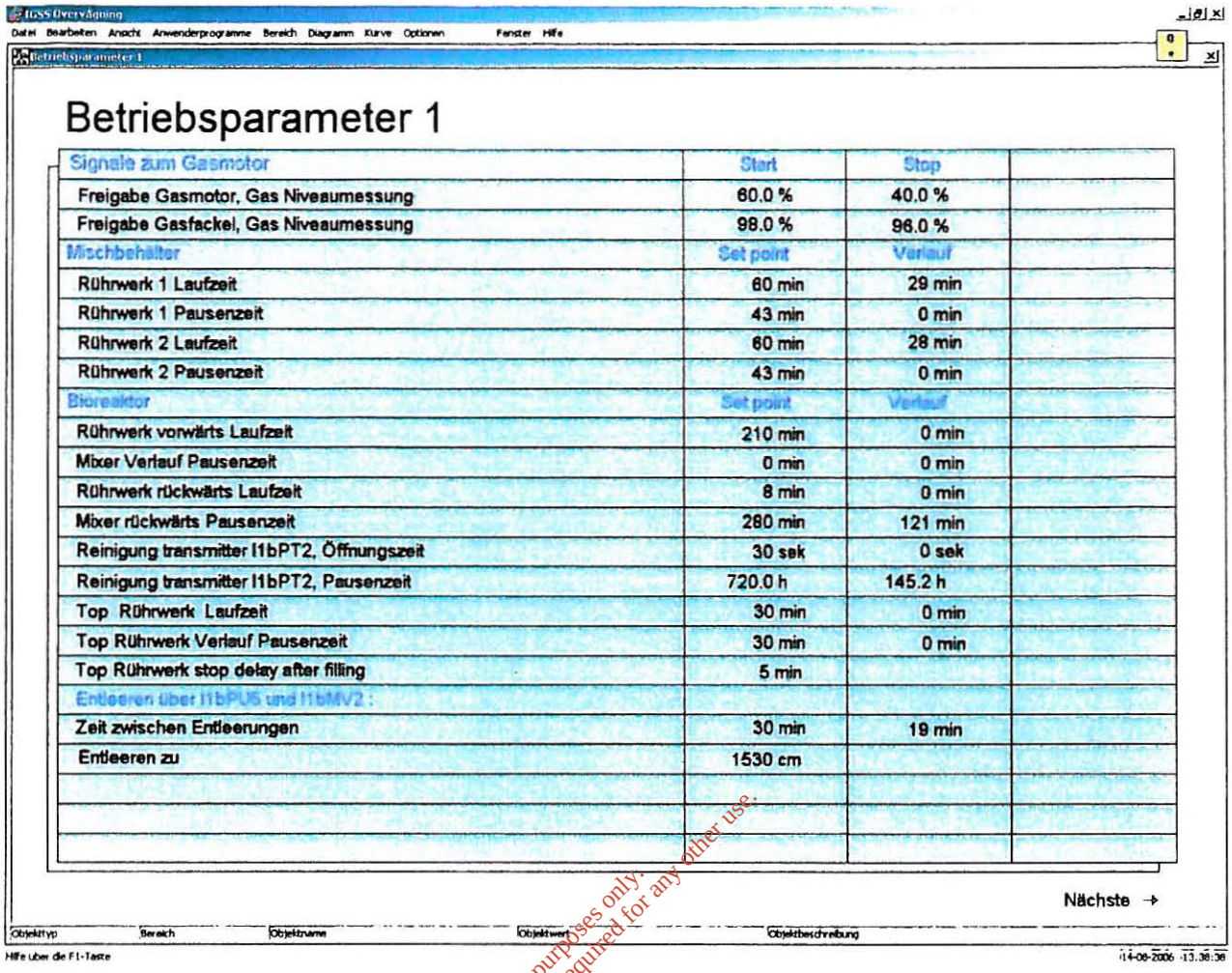



Figure 2 Biogas Plant

## 2.3 Operation Parameters 1




| Signale zum Gasmotor | Start | Stop | |
|---|---|---|---|
| Freigabe Gasmotor, Gas Niveaumessung | 60.0 % | 40.0 % | |
| Freigabe Gasfackel, Gas Niveaumessung | 98.0 % | 96.0 % | |
| Mischbehälter | Set point | Verlauf | |
| Rührwerk 1 Laufzeit | 60 min | 29 min | |
| Rührwerk 1 Pausenzeit | 43 min | 0 min | |
| Rührwerk 2 Laufzeit | 60 min | 28 min | |
| Rührwerk 2 Pausenzeit | 43 min | 0 min | |
| Bioreaktor | Set point | Verlauf | |
| Rührwerk vorwärts Laufzeit | 210 min | 0 min | |
| Mixer Verlauf Pausenzeit | 0 min | 0 min | |
| Rührwerk rückwärts Laufzeit | 8 min | 0 min | |
| Mixer rückwärts Pausenzeit | 280 min | 121 min | |
| Reinigung transmitter I1bPT2, Öffnungszeit | 30 sek | 0 sek | |
| Reinigung transmitter I1bPT2, Pausenzeit | 720.0 h | 145.2 h | |
| Top Rührwerk Laufzeit | 30 min | 0 min | |
| Top Rührwerk Verlauf Pausenzeit | 30 min | 0 min | |
| Top Rührwerk stop delay after filling | 5 min | | |
| Entleeren über I1bPU5 und I1bMV2 : | | | |
| Zeit zwischen Entleerungen | 30 min | 19 min | |
| Entleeren zu | 1530 cm | | |
| | | | |
| | | | |
| | | | |

Fig. 3 Operation Parameters 1

## 2.4 Operation Parameters 2

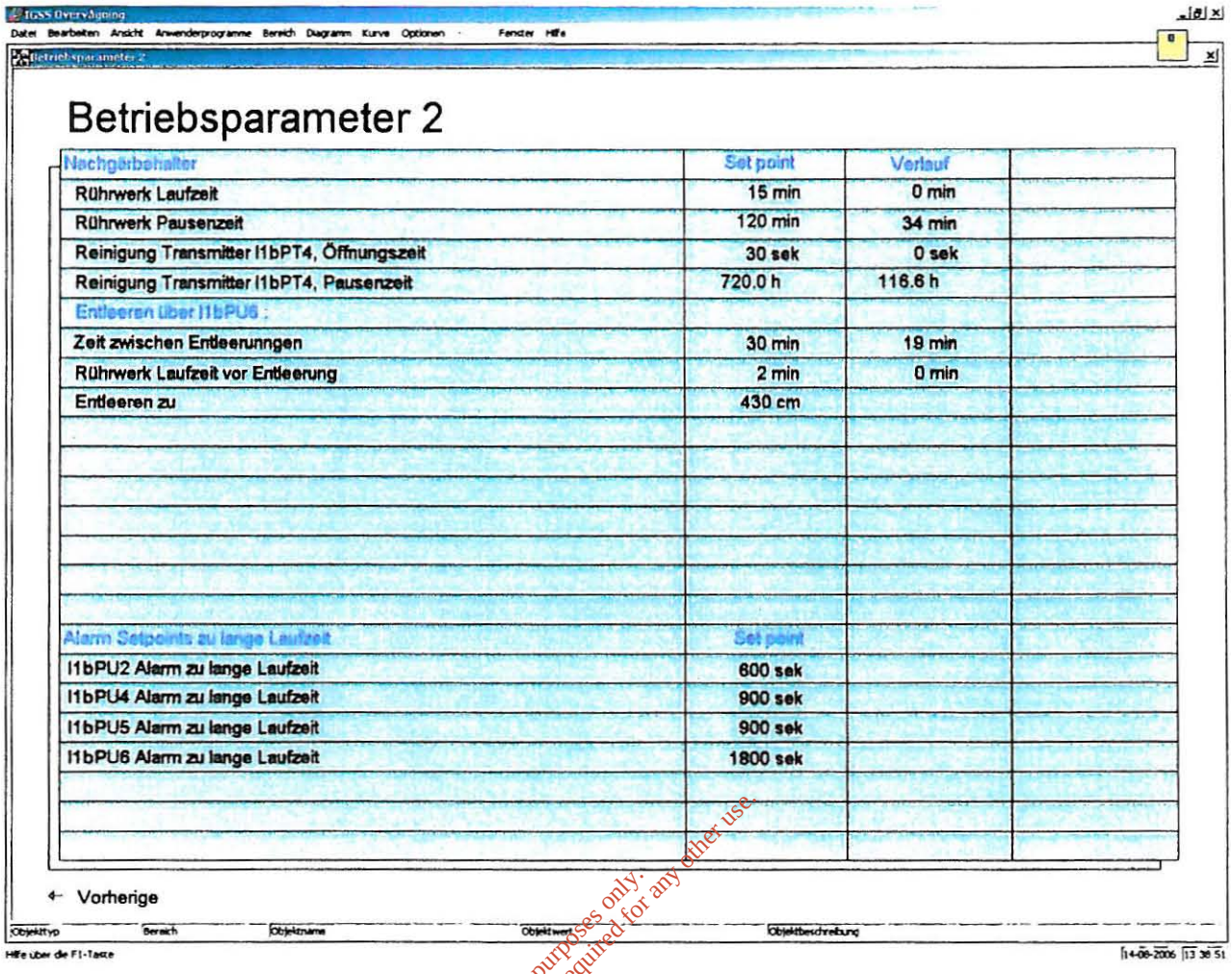
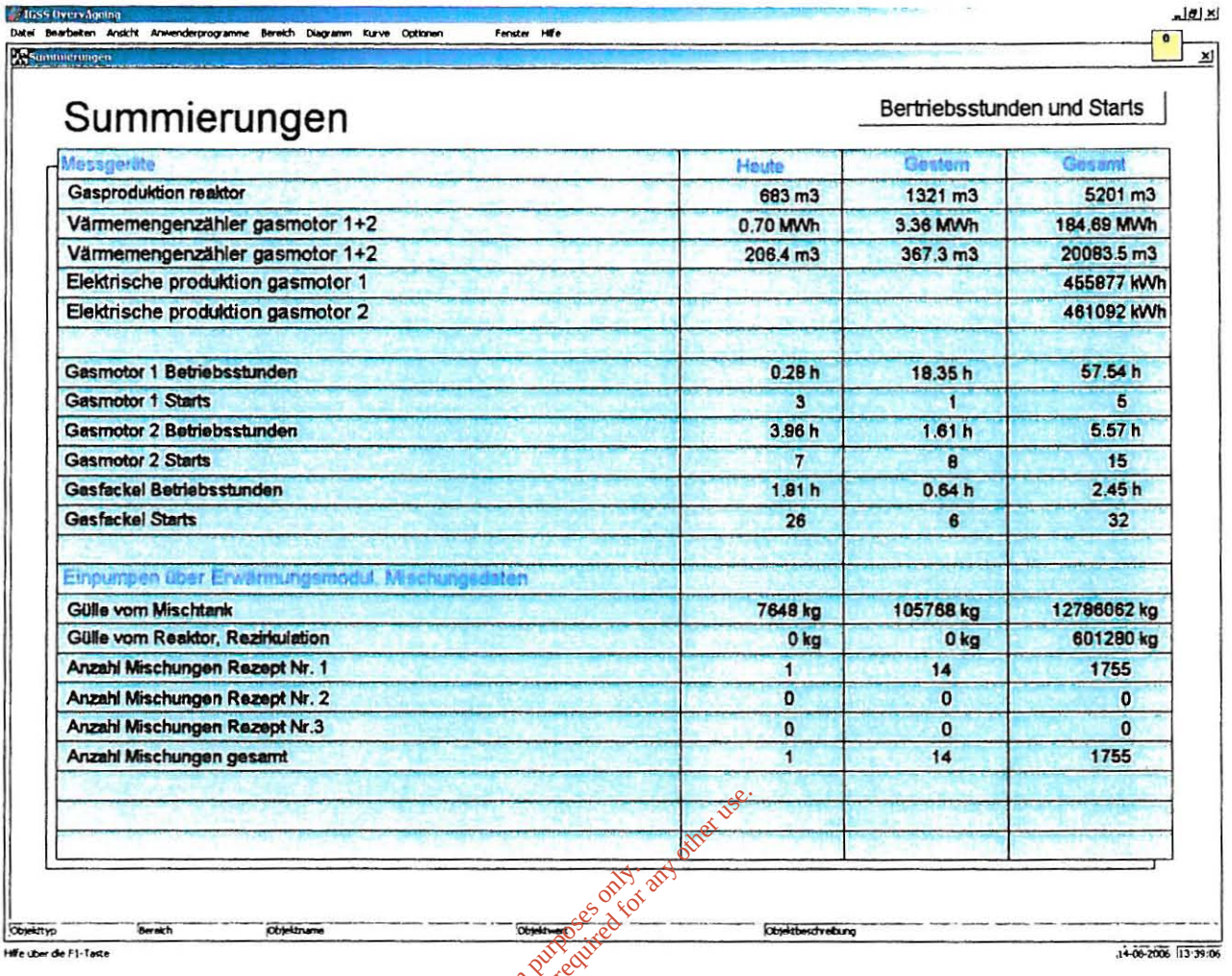



Figure 4 Operation Parameters 2

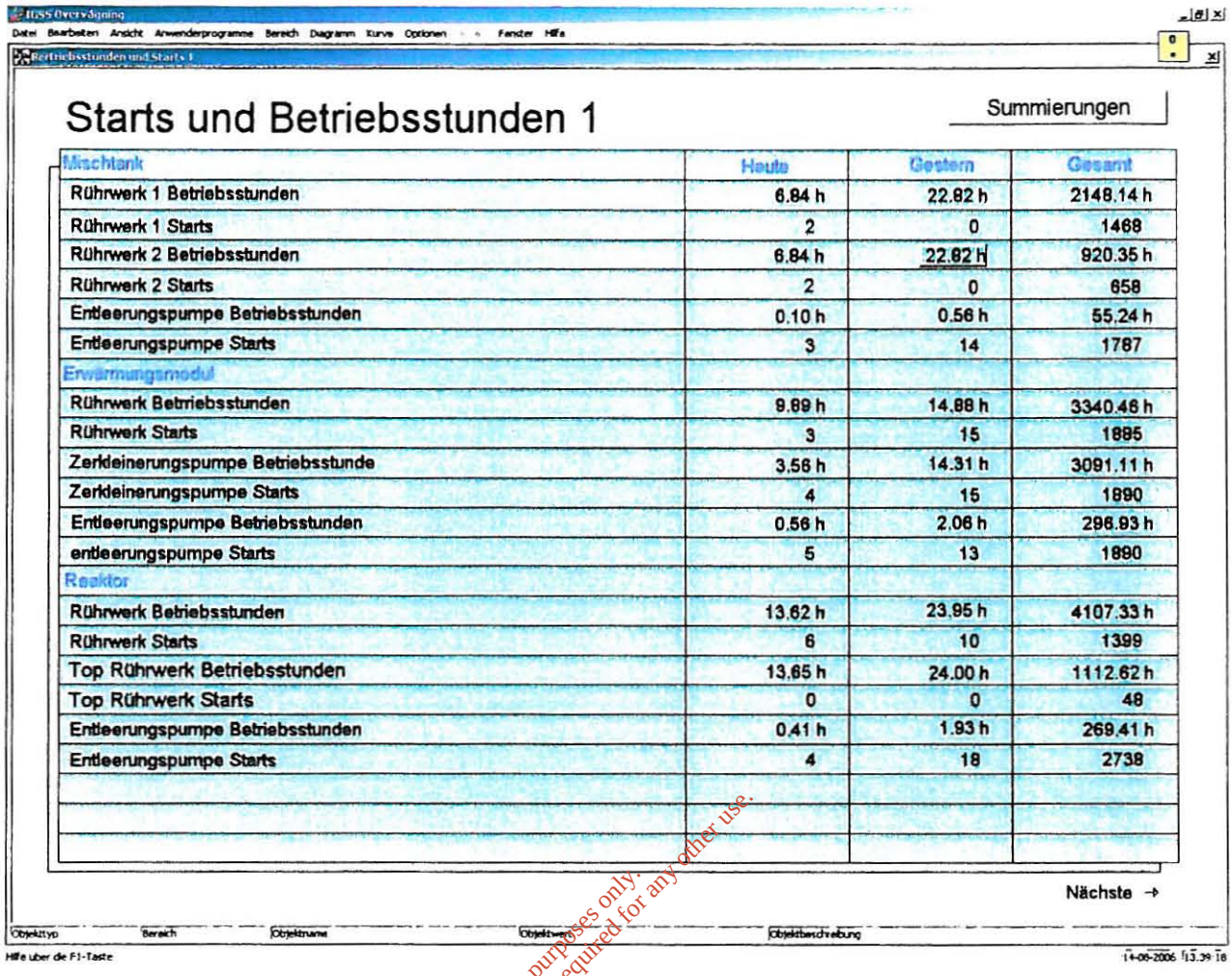
## 2.5 Summing Up




| Messgeräte | Heute | Gestern | Gesamt |
|---|---|---|---|
| Gasproduktion reaktor | 683 m3 | 1321 m3 | 5201 m3 |
| Värmemengenzähler gasmotor 1+2 | 0.70 MWh | 3.36 MWh | 184.69 MWh |
| Värmemengenzähler gasmotor 1+2 | 206.4 m3 | 367.3 m3 | 20083.5 m3 |
| Elektrische produktion gasmotor 1 | | | 455877 kWh |
| Elektrische produktion gasmotor 2 | | | 461092 kWh |
| | | | |
| Gasmotor 1 Betriebsstunden | 0.28 h | 18.35 h | 57.54 h |
| Gasmotor 1 Starts | 3 | 1 | 5 |
| Gasmotor 2 Betriebsstunden | 3.96 h | 1.61 h | 5.57 h |
| Gasmotor 2 Starts | 7 | 8 | 15 |
| Gasfackel Betriebsstunden | 1.81 h | 0.64 h | 2.45 h |
| Gasfackel Starts | 26 | 6 | 32 |
| | | | |
| Einpumpen über Erwärmungsmodul, Mischungsdaten | | | |
| Gülle vom Mischtank | 7648 kg | 105768 kg | 12786062 kg |
| Gülle vom Reaktor, Rezirkulation | 0 kg | 0 kg | 601280 kg |
| Anzahl Mischungen Rezept Nr. 1 | 1 | 14 | 1755 |
| Anzahl Mischungen Rezept Nr. 2 | 0 | 0 | 0 |
| Anzahl Mischungen Rezept Nr.3 | 0 | 0 | 0 |
| Anzahl Mischungen gesamt | 1 | 14 | 1755 |

Figure 5 Summing Up

## 2.6 Operation Hours and Starts 1+2




| Mischtank | Heute | Gestern | Gesamt |
|---|---|---|---|
| Rührwerk 1 Betriebsstunden | 6.84 h | 22.82 h | 2148.14 h |
| Rührwerk 1 Starts | 2 | 0 | 1468 |
| Rührwerk 2 Betriebsstunden | 6.84 h | 22.82 h | 920.35 h |
| Rührwerk 2 Starts | 2 | 0 | 658 |
| Entleerungspumpe Betriebsstunden | 0.10 h | 0.56 h | 55.24 h |
| Entleerungspumpe Starts | 3 | 14 | 1787 |
| Erwärmungsmodul | | | |
| Rührwerk Betriebsstunden | 9.89 h | 14.88 h | 3340.46 h |
| Rührwerk Starts | 3 | 15 | 1895 |
| Zerkleinerungspumpe Betriebsstunde | 3.58 h | 14.31 h | 3091.11 h |
| Zerkleinerungspumpe Starts | 4 | 15 | 1890 |
| Entleerungspumpe Betriebsstunden | 0.56 h | 2.06 h | 296.93 h |
| entleerungspumpe Starts | 5 | 13 | 1890 |
| Reaktor | | | |
| Rührwerk Betriebsstunden | 13.62 h | 23.95 h | 4107.33 h |
| Rührwerk Starts | 6 | 10 | 1399 |
| Top Rührwerk Betriebsstunden | 13.65 h | 24.00 h | 1112.62 h |
| Top Rührwerk Starts | 0 | 0 | 48 |
| Entleerungspumpe Betriebsstunden | 0.41 h | 1.93 h | 269.41 h |
| Entleerungspumpe Starts | 4 | 18 | 2738 |

Figure 6.1 Operation Hours and Starts 1

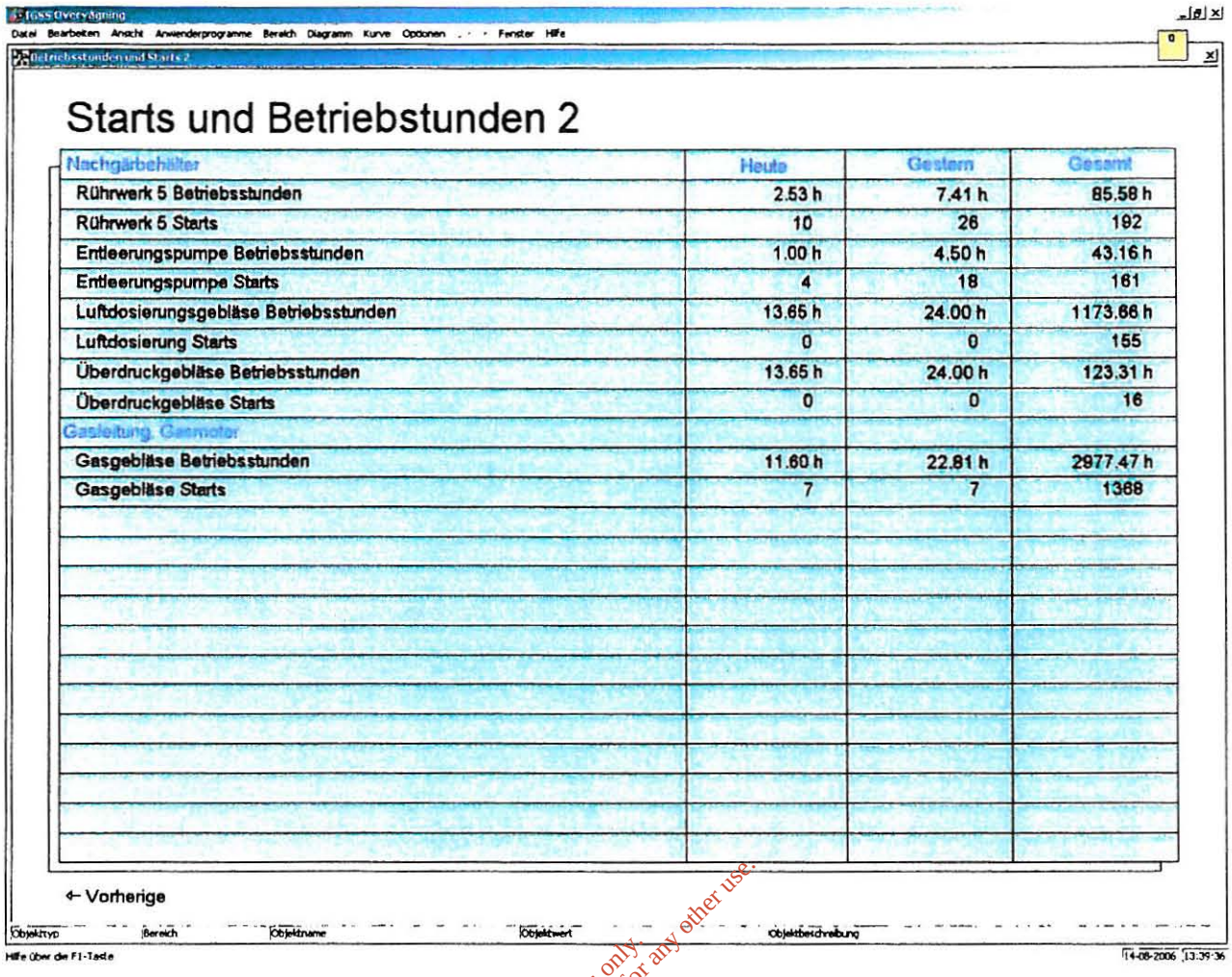



Figure 6.2 Operation Hours and Starts 2

## 2.7 Heating Module

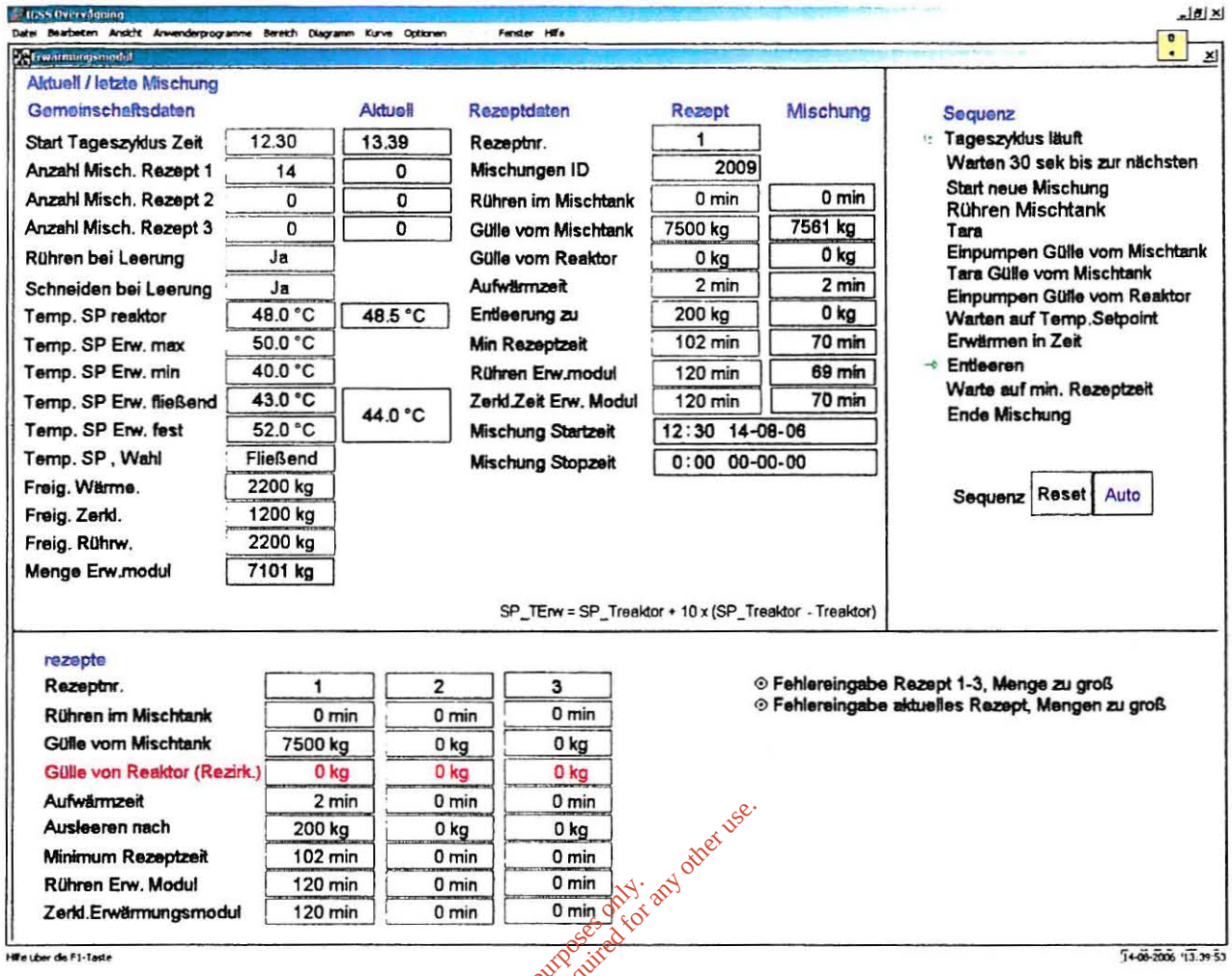



Figure 7 Heating Module

# 2.8 Gas Blower Controller


Figure 8 Gas Blower Controller

# 2.9 Controller for Oxygen Dosing Blower

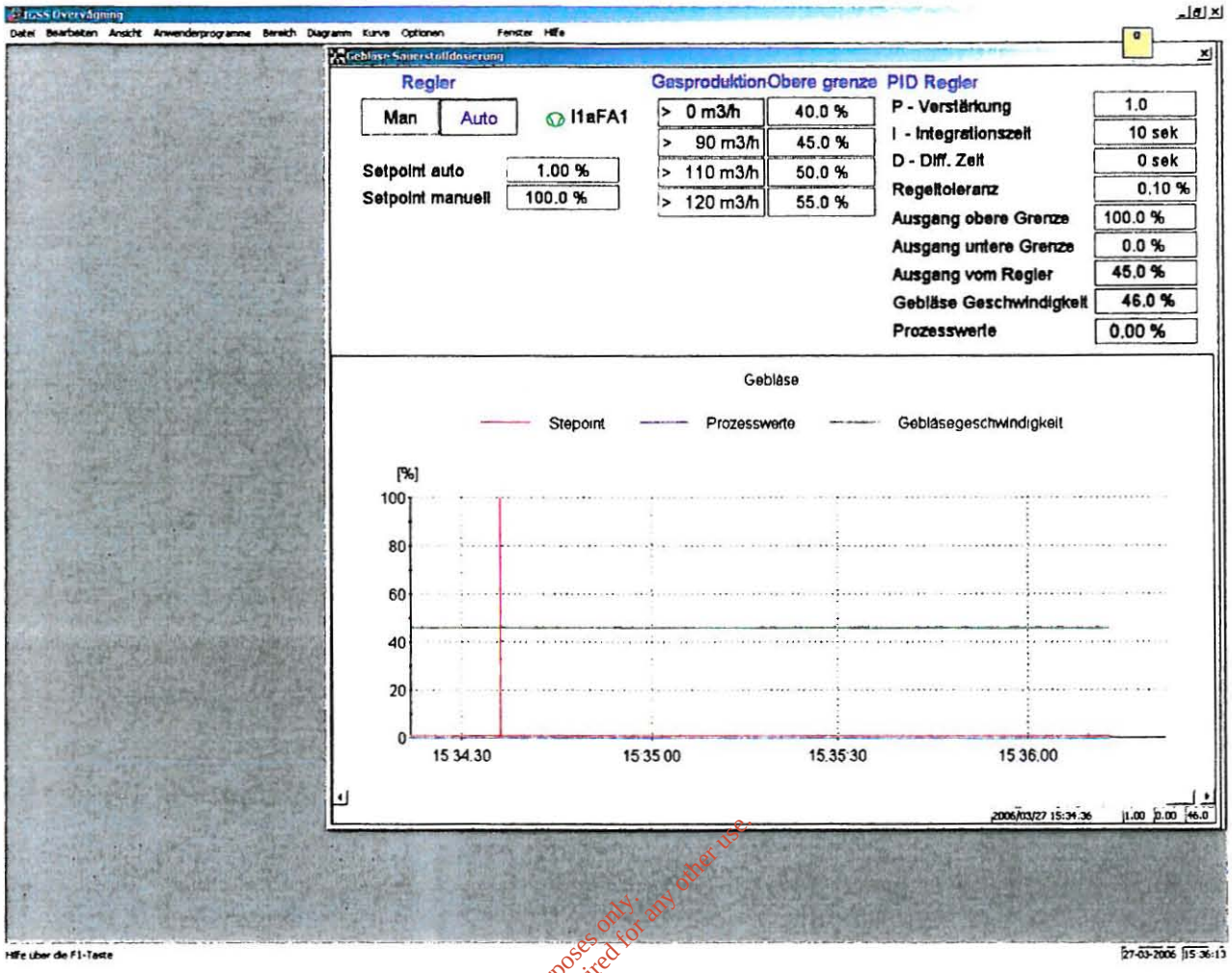



Figure 9 Controller for Oxygen Dosing Blower

## 2.10 Controller for Heating Valve on Heating Module

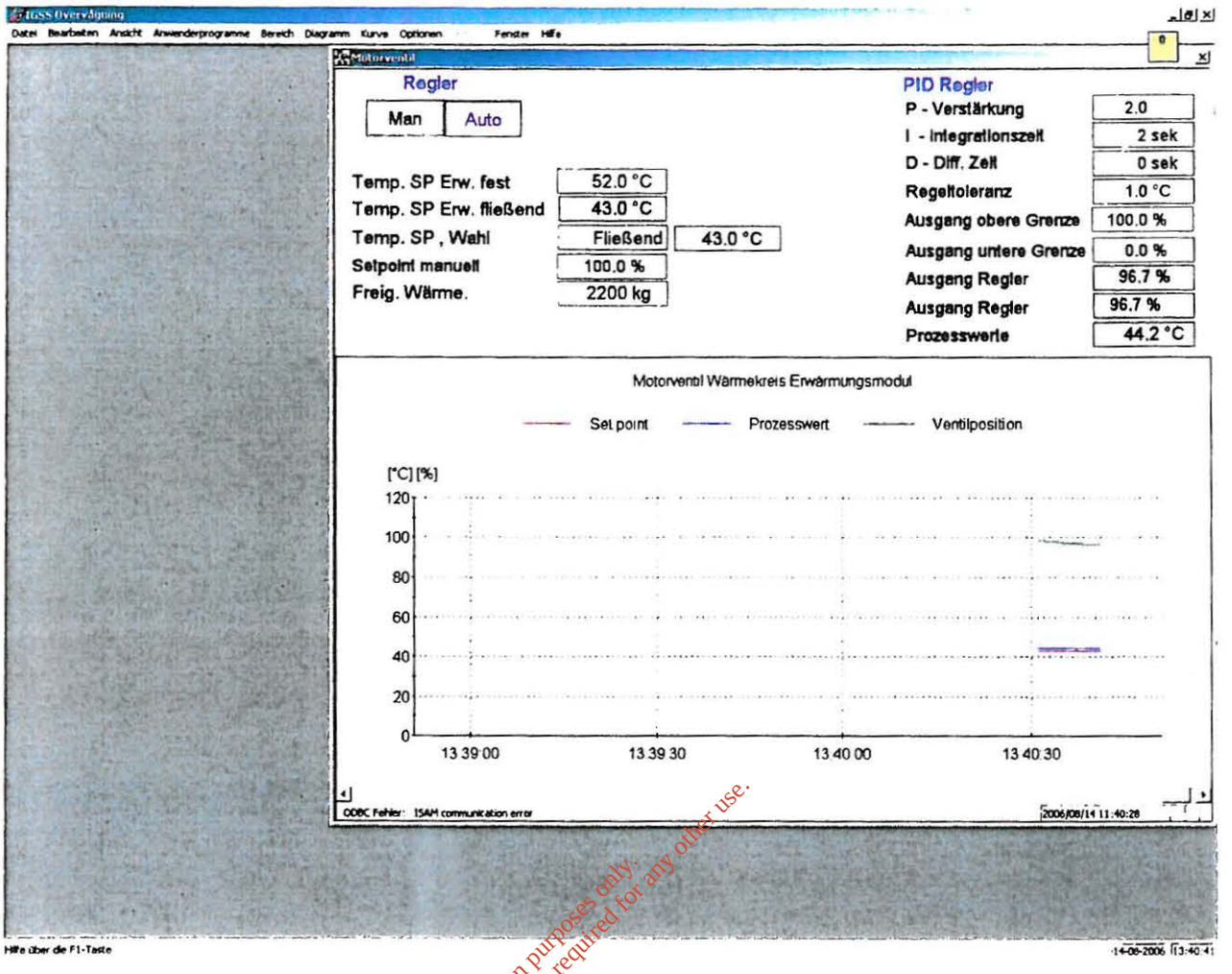



Figure 10 Controller for Heating Valve

# 2.11 Gas Engine

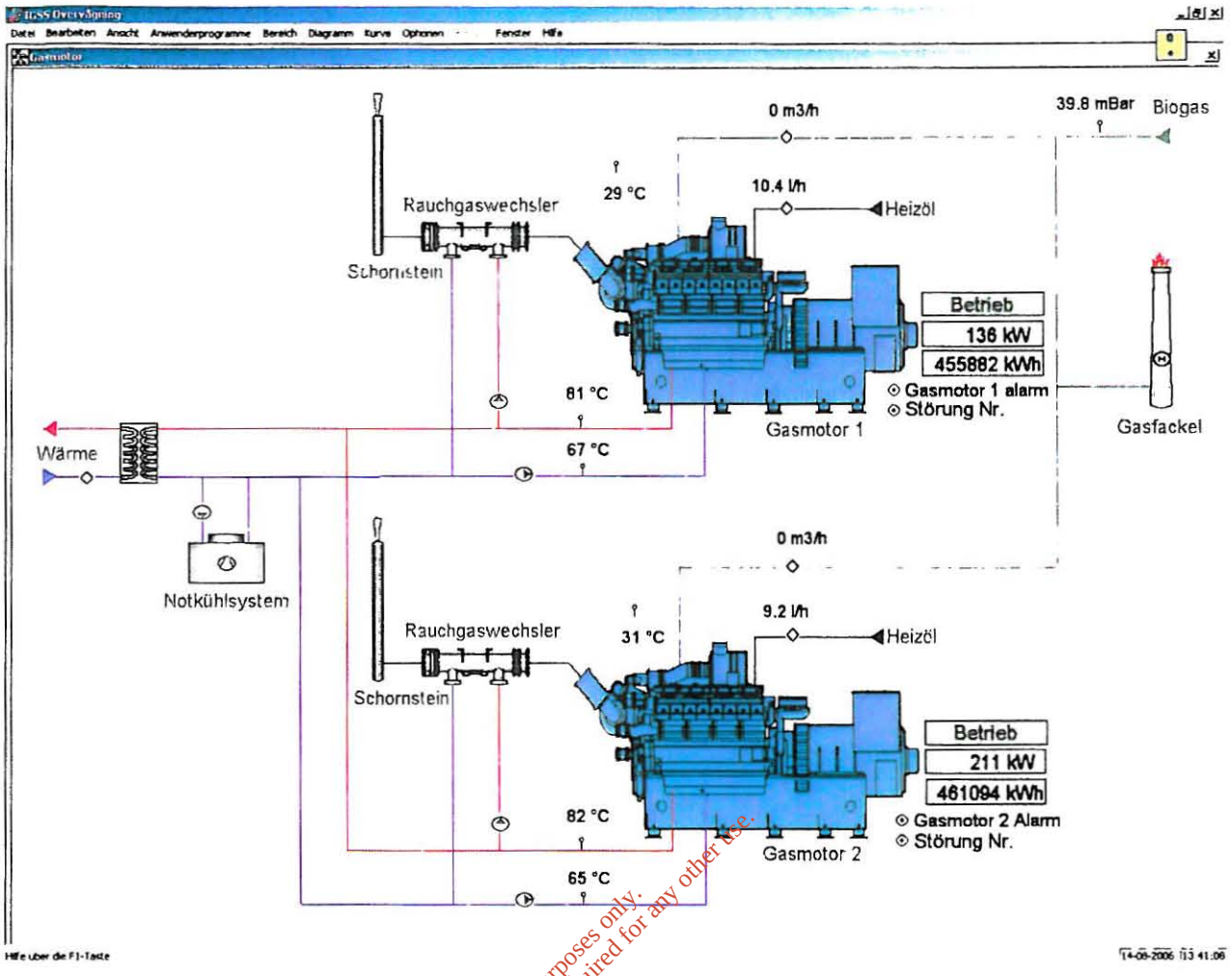



Figure 11 Gas Engine

## 2.12 Service

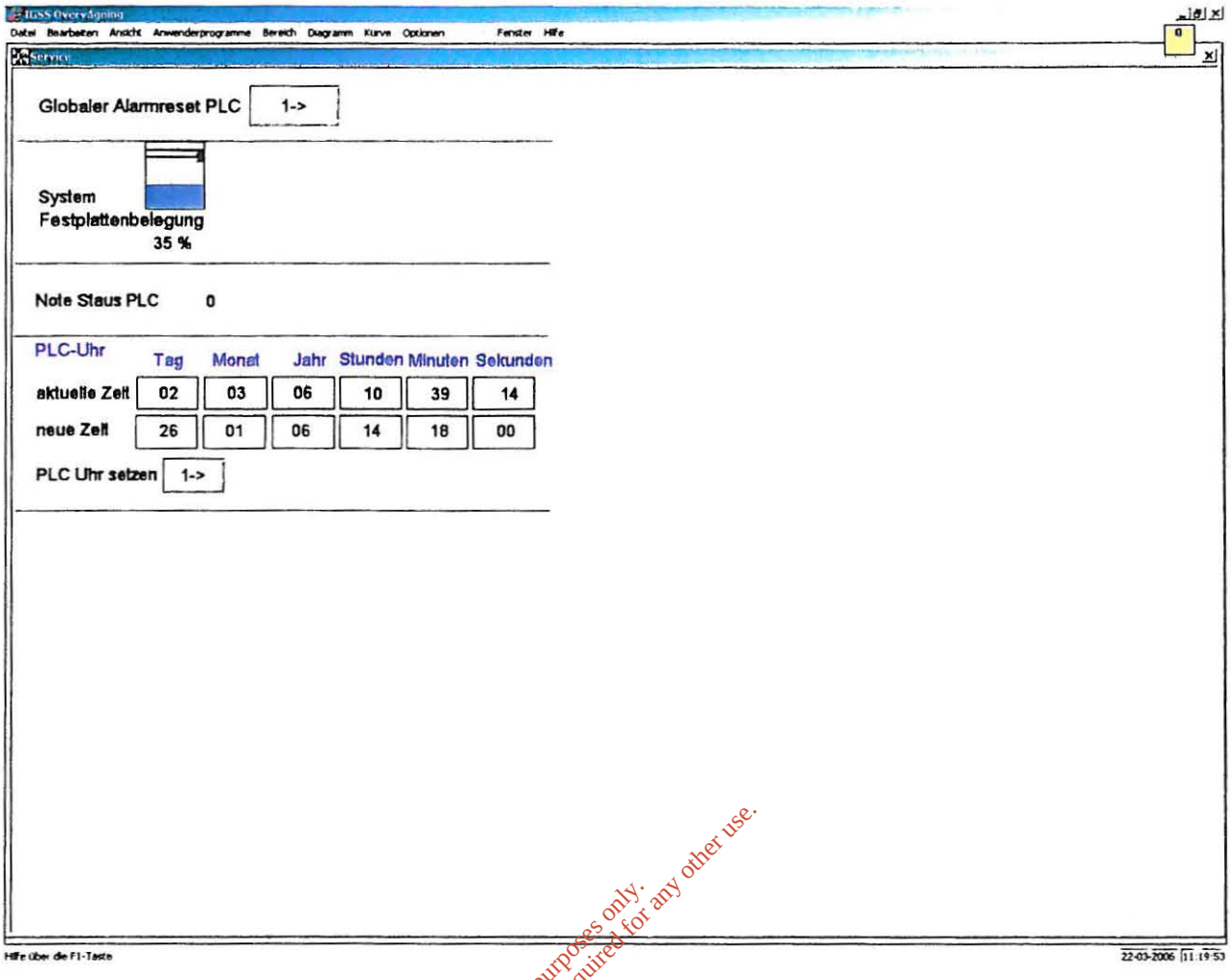



Figure 12 Service

## 2.13 Batch Reports

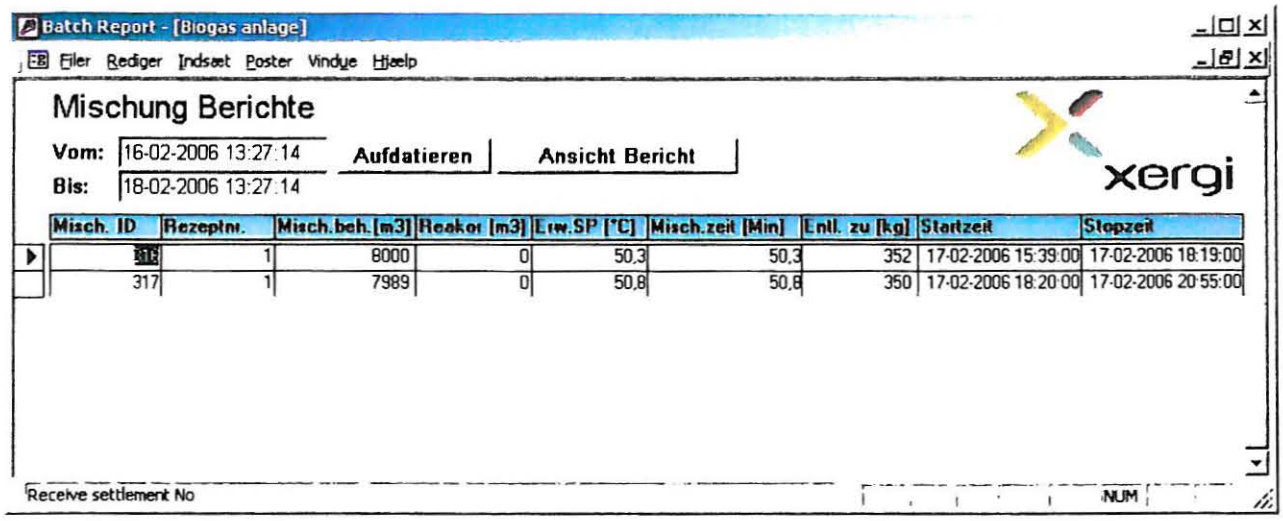



Figure 13.1 Overall View of Batch Reports

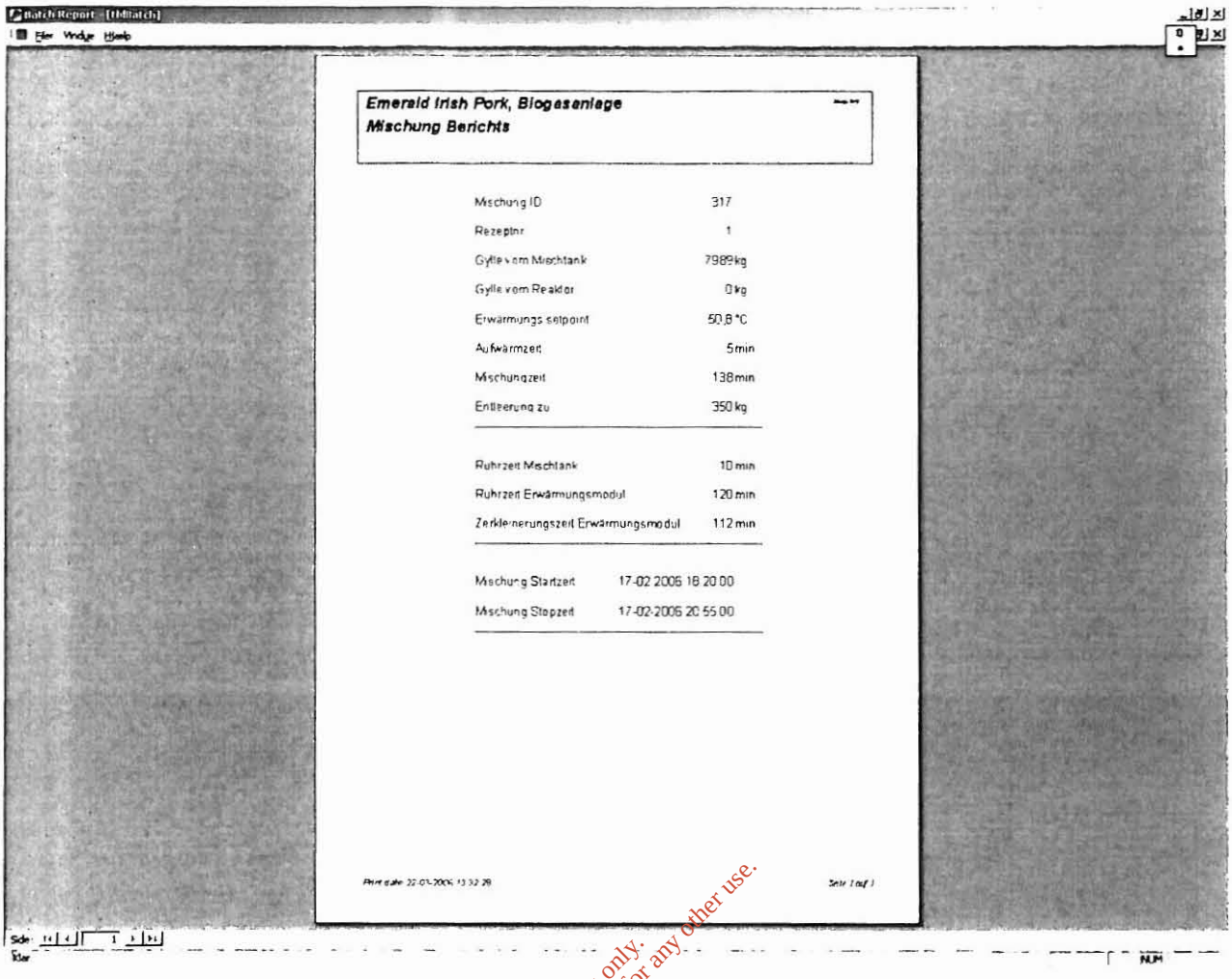



Figure 13.2 Example of Batch Report